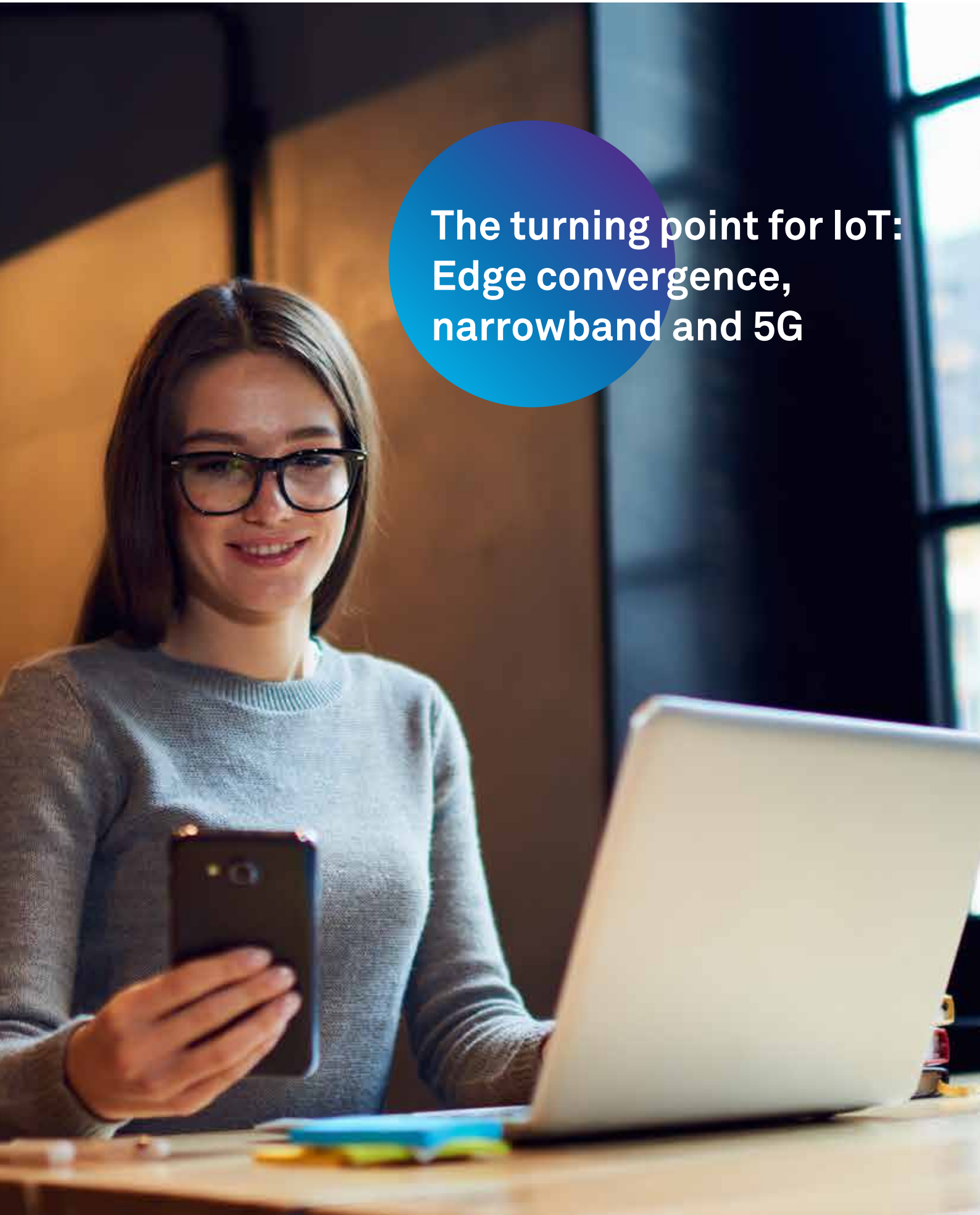

The turning point for IoT: Edge convergence, narrowband and 5G

The Internet of Things (IoT) is at the cusp of changing all business sectors including Retail. A number of significant technology changes have come together to enable the rise of IoT. Prices of IoT hardware is dropping, putting sensors, processing power, network bandwidth, and cloud storage within reach of more users and making a wider range of IoT applications practical.

Edge convergence: Towards low latency and high bandwidth

Over the past 15-20 years, enterprises have embraced the shift from on-premises to cloud computing to drive better outcomes and new business models. The cloud eliminated the limitations of fixed-location servers, and even today, remains the best option for historical data storage analysis. However, with the emergence of IoT, the need for low latency data storage solutions became obvious and edge computing started to gain ground. Edge computing is particularly suited for IoT as most IoT data sensing and gathering devices are distributed geographically. It helps fill the gap between centralized cloud components and IoT devices.

The early use cases of IoT that leveraged edge computing work on a 'capture-store-forward' model. For example, Railnova, a technology company engaged in railway fleet management, leverages edge computing and IoT device sensors to enable varied use cases – from failure detection to in-service support and predictive maintenance[1]. However, edge computing using low-end gateways presents several challenges. The challenges include slower rates of data transmission, high costs, and latency, which is critical for control systems.

Leveraging IoT's potential for optimal outcomes, (i.e. the ability to take corrective action based on the results of the analysis) requires localized computing. Advanced IoT use cases operate on a 'capture-store-analyze-control' model, where the control function is activated to take relevant action based on the results of the analysis. For this, real time processing, high bandwidth availability, and reliability are crucial. This is where edge convergence comes into the picture. Edge convergence combines multiple devices and equipment on to a single edge to utilize high-end gateways for advanced compute and analytics capabilities.

Edge convergence in action

Imagine a smart city. In the case of time-sensitive events, such as traffic management and surveillance at a busy junction, edge convergence presents a clear advantage over the cloud.
A traffic junction in a smart city may have 6-8 services - such as lighting, signal operation, violation detection and so on - that are operating simultaneously. Most of these services operate on inputs from multiple IoT sensors and devices. Currently, they often connect on fiber networks which are cost-prohibitive or other media such as 2G, 3G or 4G. All of these services can be converged on to a single high-end edge gateway to run real time compute, analytics and correlation along with redundancy. The result: highly efficient smart services such as traffic regulation, real time surveillance, environmental sensing and so on.

Let's consider another example in the smart city scenario. In the event of an accident, the traffic signals in the area around the accident need to be reset in real time. This also requires the capabilities offered by edge convergence - processing the data here and now.

The future of connectivity

Edge-based IoT use cases demand relevant communication options. While there is no standardized network, low power wide-area network (LPWAN) technologies such as These technologies consume less power and deliver wide area coverage – two critical imperatives. However, the real challenge with LPWAN technologies is availability. As these are proprietary in nature. They are also not well-established in developing countries, which further leads to challenges in sourcing devices that are compatible with them. Furtherlocalregulations and a high-level of interference with other forms of radio communications add an extra layer of complexity in adopting LPWAN technologies.

On the other hand, Narrowband IoT (NB-IoT) – a recent entrant to the IoT connectivity market - is under implementation across the globe. NB-IoT is a cellular-grade wireless technology that uses Orthogonal frequency-division multiplexing (OFDM) modulation, with a goal of standardizing IoT devices for enhanced interoperability.

The winning factor for NB-IoT is that despite being a message-based technology like LPWAN, its faster modulation rate makes it ideal to handle a lot more data. It also provides wide area coverage, upwards of five kilometers. Due to the significant benefits it offers, NB-IoT has already found favor among leading telecommunication providers such as Deutsche Telekom, Vodafone, and Verizon[2] as well as IoT device and sensor manufacturers. This is set to drive high penetration at low costs and maintenance levels for multiple IoT use cases, especially those with large geographical spread such as agriculture, transportation and environmental monitoring.

A combination of edge convergence and NB-IoT would work best as the high-end edge gateway can enable computation, data storage, and real time analysis, enabling many new use cases beyond the current point data or GPS based ones.

NB–IoT also comes with open technology architecture and larger ecosystem working not only on base network technologies but also communication modules for various devices, sensors and gateways.

5G – what does it mean for IoT?

Hailed as the next frontier of IoT innovation, the impending marriage of 5G and IoT promises huge benefits and completely new applications across industries, including automotive, agriculture, manufacturing, IT and others. A combination of IoT technologies augmented with Big Data analytics and Multi-Access Edge Computing (MEC) will extend cloud computing capabilities to the edge of the Radio Access Network (RAN). This will form the basis of enabling real time data, faster speeds (up to 10 GBPS), high-bandwidth, and low-latency that 5G radio networks are associated with.
The implication of this for businesses is huge. They will be able to run all use cases on wireless technology with real time communications between the edge and the cloud - at an optimal cost. The potential of 5G also lies in its ability to drive better quality of service (QoS) as it offers multi-tier networks enabling users to slice and dice the networks. This means, based on the use case, users can choose a network for last-mile connectivity – access, middle-tier or backhaul network – all from a single edge.

The 5G technology is still in a testing phase with early launches in Q2/Q3 2019 and expected to start picking up scale by 2022. IoT is predicted to account for one-quarter of the 41 million global 5G connections in 2024[3]. For industries, 5G will enable wireless IoT sensors placed throughout a factory or warehouse to communicate at lightening speeds. The result: seamless monitoring, greater control, and accuracy of predictive maintenance. For the consumer market, where IoT is already proliferating in the form of smart home speakers, thermostats, and motion sensors, 5G will enable wide area coverage at high speeds, thereby improving safety, security, and ease of work.

The connected future

As IoT becomes increasingly pervasive in every aspect of business across industries, investing in IoT based solutions and infrastructure can drive competitive edge and growth. Clearly, the time is ripe for forward-thinking organizations to leverage edge convergence capabilities and establish an effective 5G ecosystem to reimagine business processes, boost efficiencies, and innovate in the connected age.

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